Computer Laboratory - lab sheet 11

Task 1 Copy the program given below. Save (as `atom.cpp`), compile and run it.

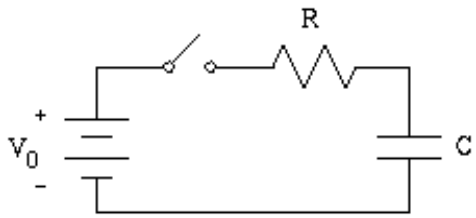
```
#include <iostream>
#include <fstream>
#include <string>
using namespace std;

class Atom{
  public:
     int    Z;
     double mass;
     string symbol;
};

void printAtom(Atom x){
  cout << "Symbol  = " << x.symbol << endl
       << "Z       = " << x.Z << endl
       << "Mass    = " << x.mass << "\n\n";
}

int main () {
  const int n = 10; // read 10 atom data
  Atom a[n];

  ifstream myfile("periodic.table");
  for (int i=0; i<n; i++){
    myfile >> a[i].Z >> a[i].symbol >> a[i].mass;
  }
  myfile.close();

  printAtom( a[8] );
}
```

File: periodic.table

```
 2  He   4.004
 3  Li   6.941
 4  Be   9.012
 5  B   10.811
 6  C   12.011
 7  N   14.007
 8  O   15.999
 9  F   18.999
11  Na  22.990
12  Mg  24.305
```

Task 2

Implement a RCcircuit class.
Each object of this class will represent a simple charging RC circuit given right. The class must include



- a default constructor function whose prototype is **`RCcircuit(double R, double C, double V0);`** to set (initialize) the values of resistance, capacitor and the DC voltage source.
- a member function named **`double current(double t)`** that returns the current in the circuit at given time t >0.
- a member function named **`double VC(double t)`** that returns potential across the capacitor at given time t > 0.
- a member function named **`double VR(double t)`** potential across the capacitor at given time t>0.
- a member function **`double tau()`** that returns the time constant of the circuit defined by $\tau = RC$.

Here is an example usage of the RCcircuit class in a main program

```
int main(){
  RCcircuit devre(2.2e+6, 1.0e-6, 12.0);
  double time = 0.0;

  cout << "time constant: " << devre.tau() << endl;

  do{
      cout << time
           << devre.current(time) << " "
           << devre.VC(time)      << " "
           << devre.VR(time)      << endl;
      time += 0.1;
  }while(time < 5*devre.tau());

}
```